

Moving IMU Steel

This procedure details the necessary steps required to move the Intermediate Muon Detectors (IMU) in the CDF Collision Hall. There are four 500-ton IMU detector assemblies that move in an east-west direction on a guided rail system in the collision hall. Each detector assembly is moved using a dedicated screw drive system that is capable of moving the assembly 120 inches in approximately 26 minutes. This motion is necessary to allow access to other detector systems in the collision hall. A checklist is included in this procedure that is to be used for every IMU move.

Editorial Hand-Processed Changes Other Than Spelling
Require Co-Project Manager Approval

HPC Number	Date	Section Number	Initials
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____

Approvals

(CDF Co-Project Manager)

(Date)

(Particle Physics Division Head)

(Date)

(Beams Division Head)

(Date)

1.0 Controlled Copies of this procedure.

Two controlled copies of this procedure will exist.

One will be held in the CDF Department Office Library.

The others will be on the CDF web page at

<http://www-cdf.fnal.gov/cdfsafecdfproclist.html>

All other copies will be marked, " INFORMATIONAL COPY ONLY "

2.0 The Procedure

The IMUs shall be moved in accordance with the checklist provided in the next Section. No other procedure is required for this move operation.

3.0 Checklist

The next several pages contain the checklist for moving the IMU detectors in the CDF Collision Hall. A separate checklist is to be filled out for each IMU being moved and for each direction of movement. Completed checklists are to be placed in the binder marked "IMU Move Checklists" in the CDF control room.

Move IMU *IN* Checklist

The minimum number of personnel required to conduct this operation is three, at least two of which must have been trained in the IMU move operation. A trained person is to act as the equipment operator, whose function is to operate the drive system controls and to watch for any problems at the back (away from the interaction region) of the IMU being moved. The others are to act as observers, whose functions are to watch for any problems at the front (B0 side) and the bore of the IMU being moved. During the move operation, no other work is to be performed in the immediate area around the equipment being moved.

IMU(s) Being Moved IN: _____ EAST _____ WEST

Date of Move Operation: _____

Printed Name of Equipment Operator: _____

Printed Name of Observers: _____

Printed Name of Person Completing This Checklist: _____

I. Preoperational Inspection

General Area

Verify all cabling is free from entanglement and out of the path of moving mechanical components.

Verify that the upper shielding fin is in the operating (extended) position.

Remove yellow rail "bridges" from the sides of IMU rails

Sweep around rails to remove any debris

Inspect the bore of the IMU to be moved for any obstructions between the IMU and the low beta magnet/cradle assembly.

Verify that all notch access equipment is removed or safely secured

Miniplug Region

Check that the miniplug "graboid" has been removed from IMU steel

Check that miniplug is secured via eye-bolts in the lower rail

Check the clearance between miniplug and solid beampipe in the miniplug bore

Check that the inner bore (CLC) plug platform is clear of equipment

Check that the BLM cables are dressed along the carbon fiber tube.

IMU Steel

Unplug lights mounted on IMU steel.

Check that the IMU platforms mounted on back of steel are clear (safety tie offs are NOT attached to it).

Check IMU cable and pipe festoons are free and clear

Verify that the scaffolding and the scaffolding mounting brackets located inside snout (for endplug crate access) are removed.

Check that the IMU circulation fans (inside snout) are plugged in and working.

Check that the front faces of the IMUs are clear of obstructions and/or foreign objects.

Endwall Region

Verify that the scaffolding mounted above shower max crates (curved ladders) is removed.

Verify that the CMX mini-skirt scaffolding (including unistrut supporting frame) is removed.

Verify that all yellow access grating is installed and locked (search and secure has been completed under the detector)

Verify that the CMX arches are pushed in.

Verify that the plug relay racks are pushed all the way in.

Check that cables to plug relay rack are inside the rack's profile.

Secure water lines for plug racks to the side of the rack

Check that the cables to the CMX miniskirts are clear of the IMU rails.

Check that protective plates on lower corners of CMX stands have been removed.

II. Preparation for Move

Plug in the motor controller box for the IMU to be moved.

Engage the disconnect switch and verify that power is supplied to the controller for the IMU to be moved.

III. Move Operation

Due to the presence of the shielding fin, the IMU move sequence is predetermined. The fin mounted IMU (either northeast or northwest) must be moved in an order so as to preclude the adjacent IMU from contacting the shielding fin. See Appendix Two for the detailed procedure regarding the IMUs moving sequence.

Note: During the move operation, the operator must remain in close proximity to the controller box so that the emergency stop button can be reached at any instant.

A. On the motor controller box, press the appropriate button for the direction of move desired. The move sequence will begin.

B. Note and record the motor current percent and the frequency of operation (displayed on the LCD display inside the controller box).

Current % _____

Frequency _____

C. The move operation will cease when the travel switch is contacted

D. Note and record the encoder reading when the movement is completed

Position (close): _____

Encoder reading (inches): _____

IV. Secure from Move Operation

Disengage the disconnect switch

Disconnect the power cable from the motor controller box and roll up cable

Verify fans on IMU are turned on

Verify lights inside IMU are turned off

Move IMU *OUT* Checklist

The minimum number of personnel required to conduct this operation is three, at least two of which must have been trained in the IMU move operation. A trained person is to act as the equipment operator, whose function is to operate the drive system controls and to watch for any problems at the back (away from the interaction region) of the IMU being moved. The others are to act as observers, whose functions are to watch for any problems at the front (B0 side) and the bore of the IMU being moved. During the move operation, no other work is to be performed in the immediate area around the equipment being moved.

IMU(s) Being Moved OUT: _____EAST _____WEST

Date of Move Operation:_____

Printed Name of Equipment Operator:_____

Printed Name of Observers:_____

Printed Name of Person Completing This Checklist:_____

V. Preoperational Inspection

General Area

Verify all cabling is free from entanglement and out of the path of moving mechanical components.

Verify that the upper shielding fin is in the operating (extended) position.

Remove yellow rail "bridges" from the sides of IMU rails

Sweep around rails to remove any debris

Make sure no lifts or ladders are in the path of the IMU steel

Check IMU cable and pipe festoons are free and clear

IMU Steel

Check that the IMU platforms mounted on back of steel are clear (safety tie offs are NOT attached to it).

VI. Preparation for Move

Plug in the motor controller box for the IMU to be moved.

Engage the disconnect switch and verify that power is supplied to the controller for the IMU to be moved.

VII. Move Operation

Due to the presence of the shielding fin, the IMU move sequence is predetermined. The fin mounted IMU (either northeast or northwest) must be moved in an order so as to preclude the adjacent IMU from contacting the shielding fin. See Appendix Two for the detailed procedure regarding the IMUs moving sequence.

Note: During the move operation, the operator must remain in close proximity to the controller box so that the emergency stop button can be reached at any instant.

A. On the motor controller box, press the appropriate button for the direction of move desired. The move sequence will begin.

B. Note and record the motor current percent and the frequency of operation (displayed on the LCD display inside the controller box).

Current % _____

Frequency _____

C. The move operation will cease when the travel switch is contacted

D. Note and record the encoder reading when the movement is completed

Position (open): _____

Encoder reading (inches): _____

VIII. Secure from Move Operation

Disengage the disconnect switch

Disconnect the power cable from the motor controller box and roll up cable

Verify fans on IMU are turned off

Verify lights inside IMU are turned on

IMUs move sequence

The purpose of this section is to provide the procedure needed to close the IMUs when the North **AND** South (either west or east) steel need to be closed. The instructions about minimum personnel required, trained operator and the **Preoperational Inspection checklist** reported in Appendix One **have** to be followed before starting the move.

For clarity, from now on in this document, the move operation is referred to the IMUs on the West side

I. Preoperational Inspection

See Appendix ONE.

II. Preparation for Move

See Appendix One.

III. Move Operation

Close the South IMU to its final position checking for interferences.

Open the South IMU 4 feet to allow passage for people between the detector and the IMU front.

Move the North IMU 25" to clear the shielding fin from the vertical invar bars.

Close the fin.

Bypass the fin microswitches.

Close the North IMU to its final position checking for interferences.

Close the South IMU to its final position.

Open the shielding fin.

IV. Secure from Move Operation

See Appendix ONE

4.0 Deviations from the Procedure

All deviations from the above procedure must be approved by the Department Head, after consultation with the head of the I&I group or their deputies.

5.0 Required Training and Authorized Training Personnel.

The required training for this (CDF-II 417) procedure is in the form of "hands-on" experience gained while participating in an actual IMU move conducted by trained personnel. All personnel participating in this operation must be approved for CDF Supervised Access or CDF Controlled Access.

LIST OF AUTHORIZED TRAINING PERSONNEL FOR THIS PROCEDURE:

Name (Last, First)	I.D.#
Carter, Harry	3236
Voirin, John	4940
Roser, Rob	11910
Lukens, Pat	9382
Moccia, Stefano	12246

Either a procedure practice run led by an authorized trainer or a verbal discussion with an authorized trainer is the only required training. This choice depends on the specific procedure being performed and experience of the trainee.

6.0 Training Materials.

A copy of this procedure

7.0 List of Trained People for this procedure.

The list of trained people for this procedure will exist in written form in the CDF Department copy of this procedure. Only CDF technicians will be trained in the procedure.

Harry Carter
Rob Roser
Pat Lukens
Stefano Moccia
Dervin Allen
John Voirin
Andrew Szymulanski

8.0 References and Supporting Documentation

None